(No Model.)

T. L. BLACKWELL.

ROTARY ENGINE.

No. 526,801. Patented Oct. 2, 1894.

Fig. 1.

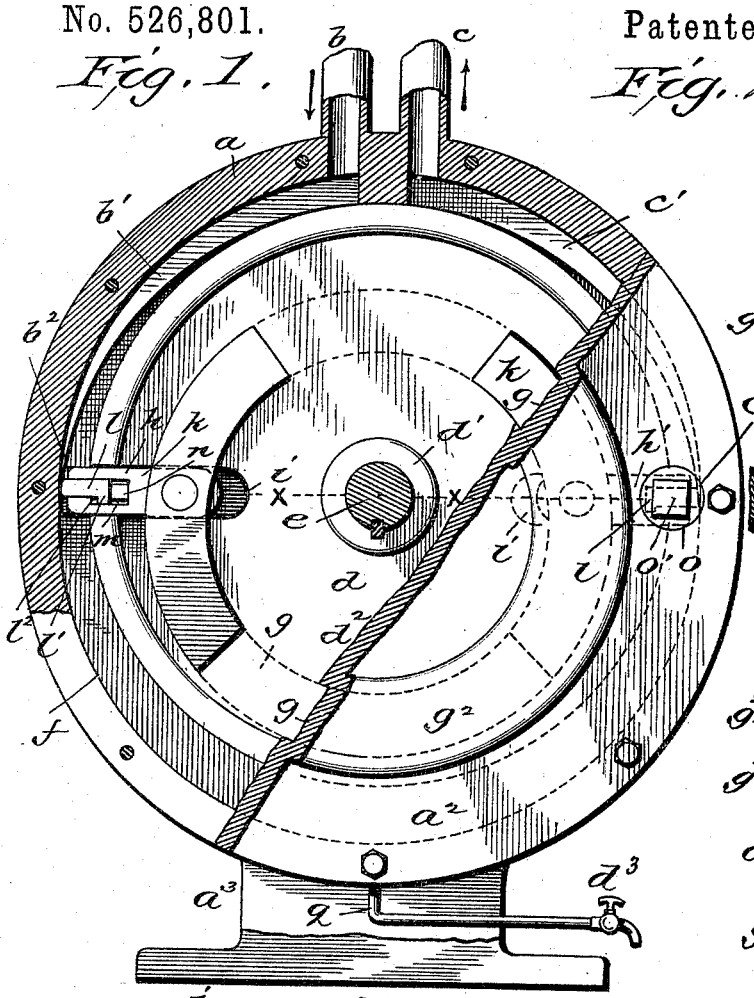


Fig. 2.

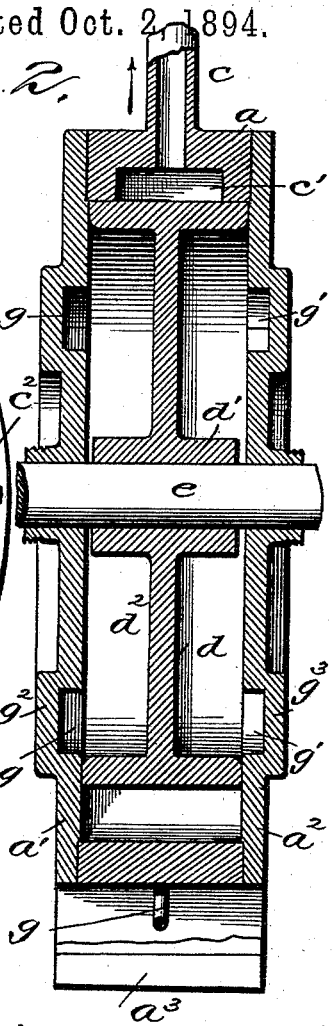


Fig. 3.

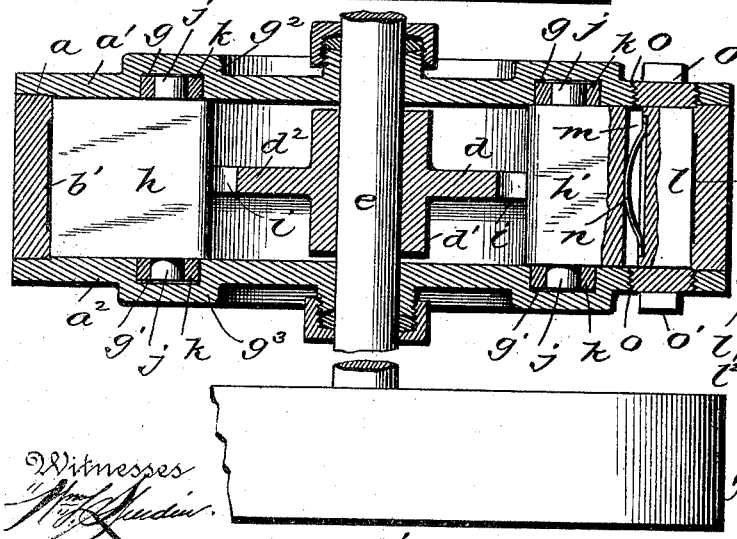
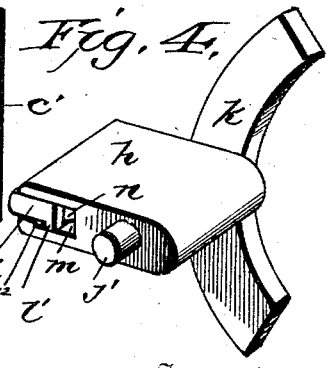


Fig. 4.



Witnesses
Wm. L. Hawkins.
Geo. R. Hamlin

Inventor
Thomas L. Blackwell
per Rhesa G. Horton
his Attorney.

UNITED STATES PATENT OFFICE.

THOMAS L. BLACKWELL, OF CORDELE, GEORGIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 526,801, dated October 2, 1894.

Application filed March 7, 1894. Serial No. 502,722. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. BLACKWELL, a citizen of the United States, residing at Cordele, in the county of Dooly and State of Georgia, have invented certain new and useful Improvements in Rotary Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention has reference to those rotary steam engines known to the art as "eccentric piston," and the object sought to be attained is the production of a more simple combination and arrangement of parts by which the steam will be more effectively used, and the wear and tear greatly reduced.

A further object of my invention is to provide means by which the packing bars when worn out can be quickly removed and new ones substituted without taking the casing apart.

A still further object of my invention is to effect smooth running of the various parts, and a still further object is to economize space and get the largest amount of power from the smallest size engine.

To these several ends my invention consists in the peculiar features and combinations of parts more fully described hereinafter and pointed out in the claims.

In the accompanying drawings: Figure 1, represents a side elevation of my complete invention, the casing being cut away to show the mechanism within; Fig. 2, a transverse vertical section through the center of the preceding figure; Fig. 3, a horizontal section through X—X of Fig. 1, and Fig. 4, a perspective view of one of the pistons detached.

The steam chest or cylinder which contains the operating parts is circular and is adapted to stand upright. It is composed of a circular section a to the opposite sides of which are bolted the disks a' and a^2, the whole being mounted on a base a^3. Steam enters into and departs from the chest at the top through ports b, and c, which may be commanded by any suitable throttle valve mechanism. Communicating with these ports are receiving and exhaust ports b' and c' formed in the section a, and each tapers gradually as it extends downwardly until it runs out at the points b^2 and c^2, diametrically opposite each other in relation to the axis of the piston head d. The piston head is keyed to a rod e extending transversely through the chest and disposed eccentrically in relation to the interior wall f, of the chest in the usual manner. In order to make this piston head as light as possible, so that it can be reversed with greater ease, I construct it of a hub d' and a narrow web d^2 which connects the hub with a wide run extending completely across the steam chest or cylinder. Pistons h and h', are located in the rim, and reciprocate endwise in elongated recesses i, radiating from the axis of the piston head, and are made to follow close to the inner circular wall, f, of the steam chest through the medium of pivoted segments k. The segments travel in annular grooves g and g', formed in the sides of the disks a' and a^2, and they are pivotally attached to the pistons through the medium of pivots j, so that as the pistons revolve the segments will travel in a circle concentric with the wall f, and hold the pistons the proper distance therefrom, and also preventing the centrifugal force from urging them too hard against the wall. To perfect a steam tight joint between the pistons and the wall f, packing bars l, are provided. These are located in chambers m. The rear edge of each bar is provided with a projection l' which is timed to come in contact with a shoulder l^2 to prevent it from flying too far out. A flat spring n is interposed between the bar and the back end of the chamber to keep the bar pressed against the wall f to effect a steam tight joint. Whenever the packing bars become worn out they can be quickly replaced through the medium of openings o, normally closed by removable screw plugs o'. These openings are located on opposite sides of the chest at a point in the path of the packing bars, and when the plugs are removed the old bar can be withdrawn, and a new one substituted thereby saving the customary trouble of taking the whole casing apart.

The disks a' and a^2 may be made of light

castings strengthened opposite the annular grooves by means of the embossments g^2 and g^3 formed on the outside of the disks.

For the purpose of drawing off the condensations from the bottom of the chest the latter is provided with a valve d^3 drain pipe q.

Having thus described the preferred construction of my device, I will now proceed to explain its operation. Assuming that the piston head is in the position shown in Fig. 1, and the steam is admitted to the chest by way of the induction port b it will impinge upon the side of the left hand piston and force it downward and around until it passes the lower end c^2 of the outlet or eduction port c. The ports are so timed that as soon as the first piston passes above this lower end the opposite piston closes the space at the lower end b^2 of the induction port b', thereby simultaneously allowing the steam to exhaust on the right and to take on the left. This disposition of the ports in relation to the pistons can be made so fine that there will be no appreciable unevenness, jerking or back action, because there will be nothing to interfere with the smooth and free rotation thereof. Now it will be observed that during very rapid rotation of the piston head the centrifugal force would naturally throw out the pistons to such an extent as to cause them to bear too tightly against the inner surfaces of the chest, but this obstacle is overcome through the medium of the segments which travel in the annular grooves and compel the pistons to maintain a uniform distance from said surface, as previously alluded to. The springs back of the packing bar tend to urge the latter outwardly against said inner surface of the chest, whereby a steam tight joint is always effected. Inasmuch as the eduction and induction ports or ducts are exact duplicates of each other, and the pistons are so constructed that the steam will act equally as well upon one side as upon the other, all that it is necessary to do in order to reverse the engine is simply to shift the valve so as to admit the steam into the eduction port c' and exhaust it from the induction port b'.

An important advantage gained by my construction is that of entirely overcoming dead centers, owing to the simultaneous action of the exhaust with the take. In addition to this advantage an engine of extreme simplicity is produced, which will allow the packing plates to be quickly renewed and the machine easily kept in order. A still further advantage is the wonderful amount of power obtained from a given quantity of steam. The gradual taper of the ports is a great advantage over those ports which have pockets or shoulders at their terminals, as it prevents the power of the steam from becoming weakened by contact with such shoulders or pockets, and allows all the power to be exerted upon the piston, while it also permits a gradual and smooth exhaust.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a rotary steam engine of the eccentric piston type, of an eccentric piston head provided with movable pistons having suitable packing devices, segments pivoted to the pistons and traveling within grooves in the steam chest and eccentric to the piston head, said pistons being located at points diametrically opposite the center of said head, and tapering induction and eduction ports terminating and commencing respectively at diametrically opposite points, substantially as described.

2. In a rotary engine, a steam cylinder or chest containing a rotary piston head provided with pistons having packing bars removable endwise therefrom, in combination with removable taps or plugs located within the path of the bars and in the opposite vertical sides of the chest, whereby the packing bars can be removed without unbolting the sides of the chest, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS L. BLACKWELL.

Witnesses:

RHESA G. DU BOIS,

GEO. R. HAMLIN.